DOCUMENT RESUME

ED 242 901 CE 038 686

TITLE	Architectural Drafting Curriculum Guide. Michigan Trade and Industrial Education.
INSTITUTION	Michigan State Univ., East Lansing. Coll. of Agriculture and Natural Resources Education Inst.
SPONS AGENCY	Michigan State Dept. of Education, Lansing. Vocational-Technical Education Service.
PUB DATE	[84]
NOTE	389p.; For related documents, see CE 038 687-696.
AVAILABLE FROM	Michigan Vocational Education Resource Center, 133 Erickson Hall, Michigan State University, East Lansing, MI 48824.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC16 Plus Postage.
DESCRIPTORS	*Architectural Drafting; *Building Plans; Competency Based Education; Curriculum Guides; *Employment Potential; Job Analysis; *Job Skills; Landscaping; *Occupational Information; Orthographic Projection; Secondary Education; Site Development; Student Evaluation; Task Analysis; *Trade and Industrial Education

ABSTRACT

This task-based curriculum guide is intended to help secondary teachers provide relevant training for an entry-level job in architectural drafting. Introductory materials include background information on trade and industrial education and program goals and safety information. Descriptions follow of the construction trades program, vocational cooperative education, work experience/unpaid work experience, work experience and career exploration programs, and vocational work study. This job information is then provided: job titles and a task inventory for architectural drafting. Tasks are grouped under these 18 duties: preparing to draw; drawing; developing geometric construction; pictorial drawing; orthographic projection; dimensioning; sectional views; auxiliary views; applying fastening techniques; identifying shop process; demonstrating job entry skills; planning and performing architectural, site preparation, landscape, electrical, structural, and heating, ventilating, and air conditioning activities; and using employability skills. Duty tabs comprise the largest portion of the curriculum guide. Each task in the listing is presented in a one-page format that provides this information: duty, task, achievement indicators, criteria, tools and equipment, and resources. Other components of the curriculum guide include a tool and equipment list, a student achievement record, a class achievement record, a glossary of vocational terms, and a resource list. (YLB)

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MICHIGAN TRADE & INDUSTRIAL EDUCATION
CURRICULUM GUIDE

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1982-83
School Year

INTRODUCTION

The Michigan Department of Education, Vocational-Technical Education Service, has adopted descriptions and codes for vocational-technical education programs found in the document entitled, "A Classification of Instructional Programs" (C.I.P.) National Center for Educational Statistics, February, 1981. This new coding system is required of all states in reporting data on all programs receiving funds under P.L. 94-482, the Vocational Education Amendments of 1976.

The current United States Office of Education (U.S.O.E.) coding system was discontinued at the conclusion of the 1981-82 school year. The 1982-83 school year is a transition year from the U.S.O.E. code system to the new C.I.P. Code system.

This Michigan Trade and Industrial Education Curriculum Guide uses the new C.I.P. program description code(s) and lists the entry level job titles associated with the occupational program area by the Dictionary of Occupational Titles (Fourth Edition, 19[illegible]), D.O.T. Code, and the Michigan Occupational Information System, (M.O.I.S.), Numerical Index code. NOTE: This information is located under Job Information with program description(s).

PROGRAM DEFINITIONS/GOALS

Vocational Education

The term "vocational education" means organized educational programs which are directly related to the preparation for paid or unpaid employment or for additional preparation for a career requiring other than a baccalaureate or advanced degree.[1]

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[1]The Education Amendments of 1976, Section 195(1), Public Law 94-482.

Goals of Vocational-Technical Education

(1) To provide persons with differing sex, age, racial/ethnic backgrounds, social-economic status, academic disadvantage, economic disadvantage, limited English speaking ability, physical and mental capabilities, and geographical location access to vocational-technical education training or retraining.

(2) To coordinate pre-vocational exploration, career guidance, and placement programs so that each student may make informed and realistic occupational choices and have access to quality placement programs.

(3) To provide all students with learning experiences which are realistic and sufficient in light of their occupational objective.

(4) To insure that all vocational-technical programs will be planned, monitored, and evaluated in light of actual or anticipated employment opportunities and the demand by students for programs related to their abilities and occupational objectives.

Trade and Industrial Education

A vocational education curriculum that includes programs for manufacturing, construction, mechanical service, public service, health service, technical, and fisheries occupations, that prepares a person for entry level employment, upgrading or retraining in a semiskilled or skilled trade, semiprofessional or technical occupation, not generally classified as Agriculture, Distributive, Business or Office, in the Health profession, or Consumer/Home Economics in nature.

NOTE: The occupational clusters found within the scope of trade and industrial education include skilled or semiskilled trade, craft, or occupations which directly relate to the designing, producing, processing, assembling, maintaining, servicing, or repairing of any manufactured product.

TRADE AND INDUSTRIAL EDUCATION STUDENT ORGANIZATION

VICA

The Vocational Industrial Clubs of America (VICA) is the national organization serving trade, industrial, technical, and health occupations students in the United States. VICA incorporates leadership, citizenship, and character

development programs and activities into the skill training offered in America's schools and taught by men and women who have worked in the occupational areas in which they now instruct their students.

VICA emphasizes respect for the dignity of work, high standards in trade ethics, workmanship, scholarship, and safety. VICA promotes understanding of the free enterprise system and encourages development of patriotism through the practice of democracy within the club.

Competitive activities in the trade skills as well as areas such as public speaking, job interview, parliamentary procedure and safety are vital aspects of VICA's program.

TRADE AND INDUSTRIAL EDUCATION CURRICULUM GUIDE

This Michigan Trade and Industrial Education Curriculum Guide is the result of a project funded by the Michigan State Board of Education and the Michigan Department of Education, Vocational-Technical Education Service. The project is located at Michigan State University in the College of Agriculture and Natural Resources' Education Institute (ANREI) and is known as the Curriculum Resource Team.

The project is directed by Dr. Chris M. Olson and Ms. Carol E. Culpepper, Faculty Specialist, Curriculum Resource Team Coordinators. They were responsible for developing the curriculum format and working with a task force leader and committee of individuals from business, industry, and education to ensure the quality of the curriculum. The development of this curriculum was monitored by Melvin France, Secondary Trade and Industrial Education Supervisor.

The names of the occupational task force leader(s) committee members, secretaries, and other support staff are acknowledged after this Introduction.

The occupational program area(s) selected for curriculum development are based on a Vocational-Technical Education Service prioritized program

ranking based on employment demand, State average percent of placement, reimbursed enrollments, the number of programs, and entry level wages within the State of Michigan.

This curriculum guide was developed from the results of a statewide survey and job analysis of incumbent workers in the related occupational areas.

The curriculum guide is representative of the occupational job duty categories which list major activities and tasks performed on an entry level job. The curriculum guide contains a resource list and criteria statements which indicate the minimum standards of performance accepted as evidence of competence in completion of the task by business and industry. This is a task-based curriculum guide which helps a teacher develop a classroom management system where students learn by doing. It is based on task analysis and reflects the skills, knowledge, and attitudes that employers expect incumbent workers to possess.

The curriculum is linked to the labor market, helps the instructor open communication channels with business and industry, and manage classroom instruction where students learn "Need-to-Know" instead of "Nice-to-Know" facts.

This curriculum is adaptable for special needs/handicapped students, helps to validate the program, prepares students for entry level jobs and helps students to make career choices related to job placement.

It is the intent by all those involved in the development of this curriculum guide that it be used to provide relevant training or retraining for employment in the world of work.

The secondary occupational programs/courses in Michigan should meet the following minimum standards to assure soundness and quality of instruction:

(1) The program of instruction must be based on a consideration of the skills and knowledge required in the occupation for which the

instruction is being provided, and includes a planned logical sequence for those essentials of education or experience deemed necessary for the individual to meet an occupational objective.

(2) The program of instruction must be developed and conducted in consultation with a Local Advisory Council/Committee which has an appropriate representation of both sexes and an appropriate representation of racial and ethnic minorities found in the program area, school, and community origin. The local advisory council will advise on current job needs, relevance of programs, and courses in meeting current job needs and consult with the local educational agency in developing program application.

(3) The program of instruction will include the most up-to-date curriculum based on the competencies required in the occupation or occupational field in which the individual is being prepared, upgraded, or updated.

(4) The program of instruction will be sufficiently extensive in duration and intensive within a schedule unit of time to enable the student to develop the necessary knowledge, attitudes, and skills necessary for employment in the occupation or occupational field.

(5) The program of instruction will combine and coordinate related instruction with field, shop, laboratory, cooperative work, or other occupational experience which is appropriate to the vocational objective of the student, is of sufficient duration to develop competencies necessary for employment in the occupation or occupational field, and supervised, directed, or coordinated by a person qualified under the State Plan.

Facilities, equipment, and instructional materials:

(1) Classrooms, libraries, shops, laboratories, and other facilities, including instructional equipment, supplies, teaching aids, and other materials will be adequate in supply and quality to meet the standands approved by the State Board so that such facilities are adequate to enable those who are to be trained to meet the occupational objective for which the education is intended.

(2) If the State Board or local educational agency cannot provide adequate facilities and materials, and such are available in a business or industrial establishment, funds may be used to reimburse the local public educational agency for training programs conducted in private industry when it complies with the training standards and regulations established by the State Board. Such instruction shall be under the supervision and administration of a local public educational agency.

ACKNOWLEDGEMENT

The Michigan Trade and Industrial Curriculum Guide(s) were developed through a series of workshops held throughout the State and at Michigan State University during the 1982-83 school year.

Appreciation is given to all who have contributed their thoughts, time and energy to this curriculum project.

The Michigan Department of Education, Vocational-Technical Education Service, is indebted to the following individuals who were instrumental in the completion of this project and the development of the materials:

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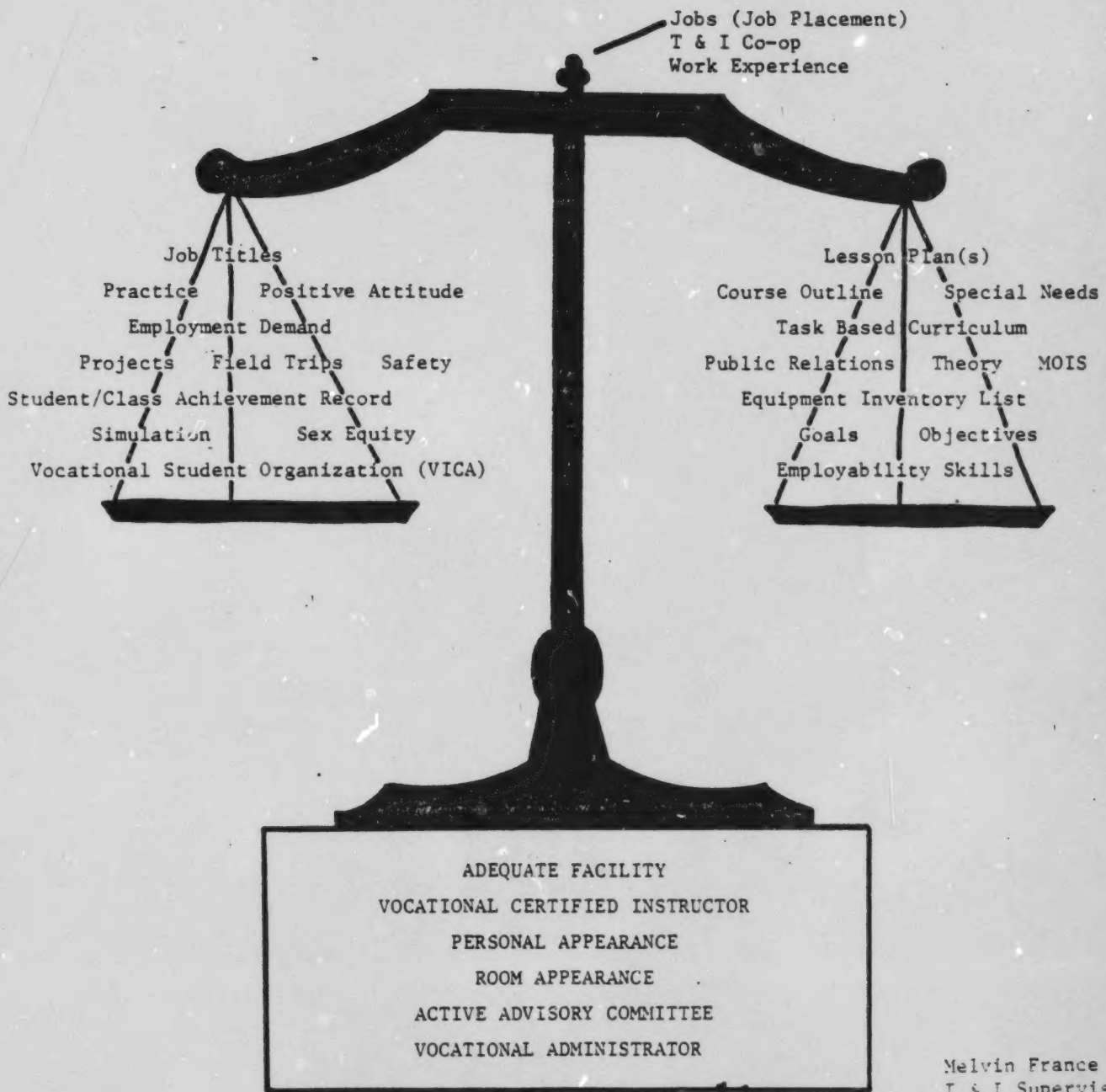
MICHIGAN TRADE AND INDUSTRIAL EDUCATION

IS YOURS A BALANCED PROGRAM?



Melvin France
T & I Supervisor
Secondary Unit

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DEPARTMENT OF EDUCATION

STATE BOARD OF EDUCATION

EYE PROTECTIVE DEVICES

Filed with Secretary of State,

These rules take effect 15 days after filing with the Secretary of State

(By authority conferred on the state board of education by section 585a of Act No. 269 of the Public Acts of 1955, as added, being section 340.585a of the Compiled Laws of 1948.)

R 340.1301. Definitions.

Rule 1. As used in these rules:

(a) "Caustic" or "acid" means a material, exclusive of hot water or steam, capable of destroying, eroding or burning of flesh by chemical action.

(b) "Explosive material" means a substance capable of a large-scale, rapid and spectacular expansion which will propel materials in a manner causing injury to the human body.

(c) "Hot liquid" or "solid" means a material having effects that are physically harmful to the eyes.

(d) "Sanitizing" means the disinfecting and cleaning of eye protective devices before use.

(e) "When exposure to eye danger exists" means the exposure when a person is within that distance from sparks, flying particles, rays, molten metal, fumes, glare, glass breakage or chemical splash that such an object or condition could cause damage to his eyes, if he was not using a protective device.

R 340.1302. Educational courses requiring eye protection.

Rule 2. A public educational agency which enrolls students in the following courses when exposure to eye danger exists, shall furnish eye protective devices: vocational or industrial arts shops or laboratories involving the use of or working with hot molten metals, milling, sawing, turning, shaping, grinding, cutting or stamping of any solid materials; heat treatment, tempering or kiln firing of any metal or other materials; gas or electric arc welding; repair or servicing of any vehicles; caustic or explosive materials; or chemical or combined chemical-physical laboratory work involving acid, caustic or explosive chemicals or hot liquids or solids.

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R 340.1303. Standards for devices.

Rule 3. (1) An eye protective device shall meet the following standards based upon the operation involved:

(a) Acetylene burning, acetylene cutting, and acetylene welding operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or welding goggles of coverspec type with tinted plate lenses. This protects against the primary hazards of sparks, harmful rays, molten metal and flying particles.

(b) Chemical handling operations - goggles of flexible fitting with hooded ventilation or face shield with plastic or mesh window. This protects against the primary hazards of splash, acid burns and fumes.

(c) Chipping operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or spectacles of metal frame with sideshields or spectacles of plastic frame with sideshields or spectacles of metal-plastic frame with sideshields or chipping goggles of eyecup type with clear safety lenses or chipping goggles of coverspec type with clear safety lenses. This protects against the primary hazard of flying particles.

(d) Electric (arc) welding operations - welding goggles of coverspec type with tinted plate lenses or welding helmets or welding helmet in combination with tinted lens spectacles. This protects against the primary hazards of sparks, intense rays and molten metal.

(e) Furnace operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or welding goggles of coverspec type with tinted plate lenses. This protects against the primary hazards of glare, heat and molten metal.

(f) Light grinding, machining, and spot welding operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or spectacles of metal frame with sideshields or spectacles of plastic frame with sideshields or spectacles of metal-plastic frame with sideshields or face shield with plastic or mesh window. This protects against the primary hazards of flying particles and sparks.

(g) Heavy grinding operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or chipping goggles of eyecup type with clear safety lenses or chipping goggles of coverspec type with clear safety lenses or in case of severe exposure add face shield with plastic or mesh window. This protects against the primary hazard of flying particles.

(h) Laboratory operations - goggles of flexible fitting with hooded ventilation or face shield in combination with metal or plastic frame spectacles with sideshields. This protects against the primary hazards of chemical splash and glass breakage.

(i) Molten metal operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or face shield in combination with metal or plastic frame spectacles with sideshields and tinted lenses. This protects against the primary hazards of heat, glare, sparks and splash.

(2) The standards described in subrule (1) are taken from the American National Standards Safety Code Z87.1-1968, figure 8, page 28, which is available from the American National Standards Institute, Incorporated, 1430 Broadway, New York, New York 10018, at a cost of $5.00. Applicable excerpts from the American National Standards Safety Code are available at no cost from the Michigan department of education, Lansing, Michigan.

R 340.1304. Sanitization of devices.

Rule 4. An eye protective device shall be sanitized when 2 or more students use the same device, by either:

(a) Washing after each use in warm water and soap or detergent, followed by a rinse in running water.

(b) Placing in a cabinet with ultraviolet light and washing once a week as in subdivision (a).

R 340.1305. Compliance.

Rule 5. (1) A superintendent of a school district shall certify to the intermediate school district superintendent not later than the second week of each school year, on forms prescribed by the Michigan department of education, that eye protective devices meeting the standards of these rules have been obtained. For the school year 1972-73, certification shall be made within 4 weeks after the effective date of these rules. This certification shall also indicate that instructors have been informed that all students, teachers and visitors shall wear the devices when exposure to eye damage exists, as identified in these rules.

(2) An intermediate school district superintendent shall report to the state superintendent of public instruction by October 1 the names of those constituent school districts which are not in compliance with these rules. For the school year 1972-73, the report shall be made within 6 weeks after the effective date of these rules.

(3) The state superintendent of public instruction shall notify a school district in violation of these rules that it shall comply or show cause why compliance cannot be made within 30 days.

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ACT NO. 54 OF THE PUBLIC ACTS OF 1972

ENROLLED SENATE BILL NO. 553

AN ACT to amend Act No. 269 of the Public Acts of 1955, entitled "The Michigan School Code", and to repeal certain acts and parts of acts, as amended, being sections 340.1 to 340.984 of the Compiled Laws of 1948, by adding section 585a.

The People of the State of Michigan enact:

Section 1. Act No. 269 of the Public Acts of 1955, as amended, being sections 340.1 to 340.984 of the Compiled Laws of 1948, is amended by adding section 585a to read as follows:

Sec. 585a. (1) Every pupil and teacher participating in a course mentioned in this section shall wear industrial quality eye protective devices, which have been sanitized prior to use, when exposure to danger exists while participating in such course. The board of education shall furnish the devices for pupils, teachers and visitors to the classrooms or laboratories. The courses for which protective devices are required are:

(a) Vocational or industrial arts shops or laboratories involving the use of or working with hot molten metals, milling, sawing, turning, shaping, grinding, cutting or stamping of any solid materials; heat treatment, tempering or kiln firing of any metal or other materials; gas or electric arc welding; repair or servicing of any vehicle; or caustic or explosive materials.

(b) Chemical or combined chemical-physical laboratory work involving acid, caustic or explosive chemicals or hot liquids or solids.

(2) "Industrial quality eye protective devices" means devices meeting the standards of the american standard safety code for head, eye and respiratory protection, Z87.1-1968, promulgated by the american standards association, incorporated.

(3) The provisions of this section shall be enforced pursuant to rules promulgated by the state board of education in accordance with and subject to Act No. 306 of the Public Acts of 1969, as amended, being sections 24.201 to 24.315 of the Compiled Laws of 1948.

Section 2. This amendatory act shall take effect September 1, 1972.

The following adapted from the:

NATIONAL STANDARD SCHOOL SHOP SAFETY INSPECTION CHECK LIST

Prepared by the Joint Safety Committee of the
AMERICAN VOCATIONAL ASSOCIATION — NATIONAL SAFETY COUNCIL

_____ Date_____

_____

INTRODUCTION

A safe environment is an essential part of the school shop safety education program. The safe environment will exist only if hazards are discovered and corrected through *regular* and *frequent* inspections by school personnel—administrators, teachers and students. Safety inspections are to determine if everything is satisfactory.

Inspections may be made at the request of the board of education, the school administration or upon the initiative of the teacher. Some communities have drawn upon the cooperative service of professional safety engineers, inspectors of state labor departments, insurance companies and local safety councils to supplement and confirm inspections by school personnel.

The National Standard School Shop Safety Inspection Check List, recommended by the President's Conference on Industrial Safety is an objective inspection procedure for the school shop.

DIRECTIONS

WHO INSPECTS?

This will depend upon local policies. It is recommended, however, that shop teachers, and students—the student safety engineer and/or student safety committee—participate in making regular inspections. This not only tends to share responsibility but stimulates a broader interest in the maintenance of a safe school shop.

WHEN TO INSPECT?

As a minimum, a safety inspection should be made at the beginning of every school term or semester. More frequent inspections may be advisable.

HOW TO INSPECT?

Inspections should be well planned in advance.

Inspections should be systematic and thorough. No location that may contain a hazard should be overlooked.

Inspection reports should be clear and concise, but with sufficient explanation to make each recommendation for improvement understandable.

FOLLOW-UP

The current report should be compared with previous records to determine progress. The report should be studied in terms of the accident situation so that special attention can be given to those conditions and locations which are accident producers.

Each unsafe condition should be corrected as soon as possible in accordance with accepted local procedures.

A definite policy should be established in regard to taking materials and equipment out of service because of unsafe conditions.

The inspection report can be used to advantage as the subject for staff and class discussion.

CHECKING PROCEDURE

Draw a circle around the appropriate letter, using the following letter scheme:

S — Satisfactory (needs no attention)
A — Acceptable (needs some attention)
U — Unsatisfactory (needs immediate attention)

Recommendations should be made in all cases where a "U" is circled. Space is provided at the end of the form for such comments. Designate the items covered by the recommendations, using the code number applicable (as B-2).

In most categories, space is provided for listing of standards, requirements or regulations which have local application only.

A. GENERAL PHYSICAL CONDITION

1. Machines, benches, and other equipment are arranged so as to conform to good safety practices..... S A U
2. Condition of stairways..... S A U
3. Condition of aisles..... S A U
4. Condition of floors..... S A U
5. Condition of walls, windows, and ceiling..... S A U
6. Illumination is safe, sufficient, and well placed..... S A U
7. Ventilation is adequate and proper for conditions..... S A U
8. Temperature control..... S A U
9. Fire extinguishers are of proper type, adequately supplied, properly located and maintained..... S A U
10. Teacher and pupils know location of and how to use proper type for various fires..... S A U
11. Number and location of exits is adequate and properly identified..... S A U
12. Proper procedures have been formulated for emptying the room of pupils and taking adequate precautions in case of emergencies S A U
13. Lockers are inspected regularly for cleanliness and fire hazards. S A U
14. Locker doors are kept closed..... S A U
15. Walls are clear of objects that might fall..... S A U
16. Utility lines are properly identified..... S A U
17. Teachers know the procedure in the event of fire including notification of the fire department and the evacuation of the building. S A U
18. Air in shop is free from excessive dust, smoke, etc.... S A U
19. _____ S A U
20. _____ S A U
21. _____ S A U
22. _____ S A U
23. Evaluation for the total rating of A. GENERAL PHYSICAL CONDITION..... S A U

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B. HOUSEKEEPING

1. General appearance as to orderliness..... S A U
2. Adequate and proper storage space for tools and materials. S A U
3. Benches are kept orderly..... S A U
4. Corners are clean and clear..... S A U
5. Special tool racks, in orderly condition, and provided at benches and machines..... S A U
6. Tool, supply, and/or material room is orderly ..... S A U
7. Sufficient scrap boxes are provided..... S A U
8. Scrap stock is put in scrap boxes promptly..... S A U
9. Materials are stored in an orderly and safe condition.. S A U
10. A spring lid metal container is provided for waste and oily rags. S A U
11. All waste materials and oily rags are promptly placed in the containers ..... S A U
12. Containers for oily rags and waste materials are frequently and regularly emptied ..... S A U
13. Dangerous materials are stored in metal cabinets..... S A U
14. Machines have been color conditioned..... S A U
15. Safety cans are provided for flammable liquids..... S A U
16. Bulk storage of dangerous materials is provided outside of the main building ..... S A U
17. A toe-board or railing around a mezzanine used for storage or washing facilities ..... S A U
18. Materials are stored in an orderly and safe condition on this mezzanine ..... S A U
19. Flammable liquids are not used for cleaning purposes S A U
20. Floors are free of oil, water and foreign material..... S A U
21. Floors, walls, windows, and ceilings are cleaned periodically. S A U
22. _____ S A U
23. _____ S A U
24. _____ S A U
25. _____ S A U
26. Evaluation for the total rating for B. HOUSEKEEPING S A U

C. EQUIPMENT

1. Machines are arranged so that workers are protected from hazards of other machines, passing students, etc..... S A U
2. Danger zones are properly indicated and guarded..... S A U
3. All gears, moving belts, etc., are protected by permanent enclosure guards ..... S A U
4. All guards are used as much as possible..... S A U

C. EQUIPMENT (continued)

5. All equipment control switches are easily available to o... S A
6. All machines are "locked off" when instructor is out of the r... S A
7. Brushes are used for cleaning equipment..... S A
8. Nonskid areas are provided around machines..... S A
9. Machines are in safe working condition..... S A
10. Machines are guarded to comply with American Standards ... sociation and local state code..... S A
11. Adequate supervision is maintained when students are using ... chines and dangerous tools..... S A
12. Tools are kept sharp, clean and in safe working order S A
13. All hoisting devices are in safe operating condition... S A
14. Machines are shut off while unattended..... S A
15. Adequate storage facilities for tools, equipment, etc., not in... mediate use ..... S A
16. _____ S A
17. _____ S A
18. _____ S A
19. _____ S A
20. Evaluation for the total rating for C. EQUIPMENT.. S A

D. ELECTRICAL INSTALLATION

1. All switches are enclosed..... S A
2. There is a master control switch for all of the electrical inst... tions ..... S A
3. Electrical outlets and circuits are properly identified.. S A
4. All electrical extension cords are in safe condition and are... carrying excessive loads..... S A
5. All machine switches are within easy reach of the operators. S A
6. Electrical motors and equipment are wired to comply with... National Electric Code..... S A
7. Individual cut-off switches are provided for each machine. S A
8. Machines are provided with overload and underload control... magnetic pushbutton controls..... S A
9. No temporary wiring in evidence..... S A
10. _____ S A
11. _____ S A
12. _____ S A
13. _____ S A
14. Evaluation for the total rating for D. ELECTRICAL INSTALLATION ..... S

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E. GAS

1. Gas flow to appliances is regulated, so that when appliance valve is turned on full, the flames are not too high..... S A U

2. Gas appliances are properly insulated with asbestos or other insulating material from tables, benches, adjacent walls, or other flammable materials ..... S A U

3. No gas hose is used where pipe connections could be made. S A U

4. Gas appliances have been adjusted so that they may be lighted without undue hazard..... S A U

5. Students have been instructed when lighting gas appliances to light the match first before turning on the gas..... S A U

6. There are no gas leaks, nor is any odor of gas detectable in any part of the shop..... S A U

7. Shop instruction has been given concerning the lighting of gas furnaces operating with both air and gas under pressure.. S A U

8. When lighting the gas forge, goggles are worn..... S A U

9. When lighting the gas furnace, the following procedure is used: (a) light the match; (b) turn on the gas; (c) drop the match in the hole in top of the furnace..... S A U

10. In shutting down the gas furnace, the gas valve is closed before the air valve..... S A U

11. _____ S A U

12. _____ S A U

13. _____ S A U

14. _____ S A U

15. Evaluation for the total rating for E. GAS..... S A U

F. PERSONAL PROTECTION

1. Goggles or protective shields are provided and required for all work where eye hazards exist..... S A U

2. If individual goggles are not provided, hoods and goggles are properly disinfected before use..... S A U

3. Shields and goggles are provided for electric welding.. S A U

4. Rings and other jewelry are removed by pupils when working in the shop..... S A U

5. Proper kind of wearing apparel is worn and worn properly for the job being done..... S A U

6. Leggings, safety shoes, etc., are worn in special classes such as foundry, etc., when needed..... S A U

7. Respirators are provided for dusty or toxic atmospheric conditions such as when spraying in the finishing room..... S A U

8. Provisions are made for cleaning and sterilizing respirators. S A U

9. Students are examined for safety knowledge ability.. S A U

10. Sleeves are rolled above elbows when operating machines. S A U

11. Clothing of students is free from loose sleeves, flapping ties, loose coats, etc. ..... S A U

12. _____ S A U

F. PERSONAL PROTECTION (continued)

13. _____ S A U

14. _____ S A U

15. _____ S A U

16. Evaluation for the total rating for F. PERSONAL PROTECTION. S A U

G. INSTRUCTION

1. Shop Safety is taught as an integral part of each teaching unit. S A U

2. Safety rules are posted particularly at each danger station. S A U

3. Printed safety rules are given each student..... S A U

4. Pupils take a safety pledge..... S A U

5. Use of a safety inspector..... S A U

6. Use of a student shop safety committee..... S A U

7. Use of safety contests..... S A U

8. Motion and/or slide films on safety are used in the instruction. S A U

9. Use of suggestion box..... S A U

10. Use of safety tests..... S A U

11. Use of safety posters..... S A U

12. Talks on safety are given to the classes by industrial men. S A U

13. Tours are taken of industrial plants as a means of studying safety practices ..... S A U

14. Periodic safety inspections of the shop are made by a student committee ..... S A U

15. Men from industry make safety inspections of the shop S A U

16. Student shop safety committee investigates all accidents S A U

17. A proper record is kept of safety instructions which are given, preferably showing the signature of student on tests given in this area ..... S A U

18. Rotate students on the Shop Safety Committee so that as many students as possible have an opportunity to participate... S A U

19. _____ S A U

20. _____ S A U

21. _____ S A U

22. _____ S A U

23. Evaluation for the total rating of G. INSTRUCTION S A U

H. ACCIDENT RECORDS

1. There is a written statement outlining the proper procedure when and if a student is seriously hurt..... S A U

2. Adequate accident statistics are kept..... S A U

3. Accidents are reported to the proper administrative authority by the instructor ..... S A U

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H. ACCIDENT RECORD (continued)

4. A copy of each accident report is filed with the State Department of Education ..... S A U

5. Accident reports are analyzed for instructional purposes and to furnish the basis for elimination of hazards..... S A U

6. _____ S A U

7. _____ S A U

8. _____ S A U

9. _____ S A U

10. Evaluation for the total rating of H. ACCIDENT RECORDS. S A U

I. FIRST AID

1. An adequately stocked first aid cabinet is provided... S

2. The first aid is administered by a qualified individual S

3. The school has individuals qualified to administer first aid S

4. _____ S

5. _____ S

6. _____ S

7. _____ S

8. Evaluation for the total rating of I. FIRST AID.... S

RECOMMENDATIONS

Code No.	

For additional copies in packets of 50 send $1.42 to National Safety Council, 444 North Michigan Avenue, Chicago, Ill. 60611.

Revd. 8/78
Rep. 10M57801

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19

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48.0101 Drafting

An instructional program that generally prepares individuals to plan, prepare, and interpret mechanical, architectural, structural, pneumatic, marine, electric/electronic, topographical, and other sketches; to use reproduction materials, equipment, and processes, to develop, plan, and process charts and drawings; to develop models; and to prepare reports and data sheets for writing specifications.

Course 01 General Drafting

An approved instructional program that prepares individuals with organized specialized learning experiences which emphasize theory, use of the drafting room, and laboratory and shopwork as each relates to gathering and translating data or specifications, including the aspects of planning, preparing, and interpreting mechanical, architectural, structural, pneumatic, marine, electrical/electronic, topographical, and other drawings and sketches. Instruction is designed to provide experiences in drawing; in the use of reproduction materials, equipment, and processes; the preparation of reports and data sheets for writing specifications; the development of plan and process charts and drawings; and the development of models. Instruction emphasizes the development of skills and knowledge essential for employment in ancillary capacities such as tracers or reproduction equipment operators, and for occupations such as mechanical draftsman, structural draftsman, detailer, marine draftsman, tool designer, fixture designer, and punch and die designer.

Course 02 Architectural Drafting

An approved instructional program that prepares individuals to support architects and engineers in developing plans for buildings or other structures using a variety of building materials. Instruction includes creating layouts and designs within the specifications of building codes, zoning laws, ordinances, and other regulations. Emphasis is placed on creating styles and plans and using materials that are within cost limitations and preferences.

VOCATIONAL COOPERATIVE EDUCATION

Definition

"The term 'cooperative education' means a program of vocational education for persons who, through written cooperative arrangements between the school and employers, receive instruction, including required academic courses and related vocational instruction by alternation of study in school with a job in any occupational field, but these two experiences must be planned and supervised by the school and employers so that each contributes to the student's education and to his or her employability. Work periods and school attendance may be on alternate half days, full days, weeks, or other periods of time in fulfilling the cooperative program." (P.L. 94-482)

Responsibilities of School District

The local school district must meet all the Federal requirements of P.L. 94-482, Section 122; 45 CFR 104.531 through 104.533 and the State of Michigan Statutes and General School Laws listed below:

A. IT IS A PROGRAM OF VOCATIONAL EDUCATION.

"Vocational program" means laboratory, simulation or instruction based upon individually designed learning experiences in a vocational subject preparing the student for competencies required in a recognized occupation coded in accordance with the most recent vocational education listing of programs by the United States Department of Education.

B. THERE IS A WRITTEN AGREEMENT BETWEEN THE SCHOOL AND EMPLOYERS.

The Youth Employment Standards Act (P.A. 90 of 1978) governs the legal employment of minors in Michigan. In section 18 of the Act, a provision is made to allow a written agreement, or contract, to be entered into between an employer and the board of education of the school district, in which the minor is enrolled. This written agreement exempts a student from obtaining a work permit and allows the student to be legally employed in Michigan. The employment, however, shall not be in violation of a Federal Statute or regulation and a signed copy of the agreement shall be on file in the place of employment before a minor begins employment. The training agreement, in cooperative education, is the legal written agreement developed cooperatively between the employer, teacher-coordinator, student, and parent and outlines the responsibilities of the employer and student to the program and establishes the legal conditions of the student-learner's employment.

C. THERE IS INSTRUCTION (INCLUDING REQUIRED ACADEMIC INSTRUCTION) IN SCHOOL RELATED TO THE JOB IN ANY OCCUPATIONAL AREA.

The program is of sufficient duration to develop competencies necessary to prepare the learner for employment. It provides a coordinated instructional program combining supervised part-time employment and

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classroom instruction related to the learner's job. Related vocational instruction for cooperative education enrollees shall be scheduled weekly.

D. THE ALTERNATION OF STUDY AND WORK ARE PLANNED AND SUPERVISED BY THE SCHOOL AND EMPLOYER IN ORDER TO FURTHER THE STUDENT'S EDUCATION AND EMPLOYABILITY.

The student-learner shall be employed for an average of not less than 15 hours per week during the effective time of the individual's program. The school shall have the responsibility of providing coordination and supervision services during such time.

E. STUDENTS ARE EMPLOYED AND COMPENSATED IN CONFORMITY WITH FEDERAL, STATE AND LOCAL LAWS.

The program provides cooperative on-the-job training that (1) employs and compensates student-learners in conformity with Federal, State, and local laws and regulations and in a manner not resulting in exploitation of the student-learner for private gain, and (2) is conducted in accordance with written training agreements between local education agencies and employers.

References

Individuals requiring additional information pertaining to cooperative education principles and practices are asked to consult the Michigan Department of Education, Vocational-Technical Education Service, developed Cooperative Education Handbook available in September of 1981.

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WORK EXPERIENCE

PAID WORK EXPERIENCE

Definition

Paid work experience programs are school-sponsored and supervised employment programs. Students are allowed to earn academic credit while employed in the community. The employment serves as a means of acquiring desirable work habits and attitudes towards the world of work. The employment is not necessarily related to a student's career interest and enrollment in a related vocational education program is not required.

Objectives

Paid work experience programs are designed to provide students an opportunity to:

1. Foster positive attitudes about work, school and society
2. Promote an understanding in the dignity of work
3. Develop a student's ability to understand and function in an employer-employee relationship
4. Earn wages to remain in school
5. Experience an alternative to the traditional school program

Guidelines

1. Written work agreements should be completed between the employer, student, parent and school
2. Written work agreements should be completed in conformance to all Federal, State and local laws, rules and regulations; including non-discrimination against any student because of race, color, sex, national origin or ancestry. This policy of non-discrimination shall also apply to otherwise qualified handicapped individuals
3. Related academic instruction, where possible, should be provided
4. A school work experience coordinator should be provided to serve as a liaison between the student, employee, parents and school officials
5. Academic credit should be awarded for participation in the program

Funding

The Michigan Department of Education, the Vocational-Technical Education Service does not fund paid work experience programs.

UNPAID WORK EXPERIENCE

Definition

Unpaid work experience is a school sponsored and supervised instructional technique used in vocational education programs in which students are placed with an employer for a limited time and are not compensated during the duration of the experience.

Objectives

Unpaid work experience programs are designed to provide students with an opportunity to:

1. Receive on-site exposure to various businesses and industries while participating in a related vocational education program
2. Develop a realistic understanding of the relationship between education and the world of work
3. Enhance a positive self-image
4. Assist in the selection of occupational choices
5. Expand learning opportunities by using community resources

Guidelines

1. The training, even though it includes actual operation of the facilities of the participating employer is similar to that given in a vocational school
2. The training is for the benefit of the trainee
3. The trainee does not displace a regular employee, but does work under a regular employee's close observation
4. The participating employer does not derive an immediate advantage from the activities of the trainee
5. The trainee is not necessarily entitled to a job at the conclusion of the training period
6. The trainee is not entitled to wages for the time spent in the training
7. The training is for not more than 45 hours with a participating employer during each school semester
8. The training is conducted under a written work experience training agreement between the school district and the participating employer

Funding

The Michigan Department of Education, the Vocational-Technical Education Service does not fund unpaid work experience but considers it to be an allowable instructional activity under a given vocational education program.

WORK EXPERIENCE AND CAREER EXPLORATION PROGRAM
(W.E.C.E.P.)

I. Definition

The Work Experience and Career Exploration Program (W.E.C.E.P.) is a school-supervised and administered program that includes part-time work as an integral part of an educational program aimed at motivating 14 and 15 year-old youth toward education and preparing them for the world of work.

II. Program Objectives

There are several objectives of a W.E.C.E.P. program:

A. To provide a career-oriented educational program for dropout prone youth to become oriented and motivated toward education and the world of work.

B. To increase the desire to learn and improve educational performance.

C. To develop a greater degree of self-confidence, responsibility and aid in the maturation process of the student participants.

D. To provide student participants with on-the-job learning experiences that are in harmony with their interests, needs and objectives.

E. To improve school adjustment of student participants for whom the traditional curriculum is found to be inadequate.

F. To promote personal and social adjustment of the student participants and establish emotional stability through a feeling of being engaged in worthwhile activity.

III. Instructional Content

W.E.C.E.P. programs are planned so as to include part-time work supervised by employers and school personnel, as an integrated part of the enrollee's educational program. Students receive work experience on jobs permitted or approved under Federal or State laws. Students are in class with a W.E.C.E.P. teacher-coordinator for job-related and occupational safety, including needed individualized or remedial instruction. Students also receive a minimum of 20 hours of instruction on the Michigan Occupational Information System (MOIS) and a minimum of 30 hours of employability skills instruction. The students' employment is under the supervision of W.E.C.E.P. teacher-coordinators and employers. Students receive all State required courses necessary for graduation. The W.E.C.E.P. program is planned so that the students' individual academic achievement potential is recognized.

IV. Program Organization

The Vocational-Technical Education Service, Michigan Department of Education requires that W.E.C.E.P. programs in local districts meet the following criteria:

A. Eligibility. Any student aged 14 or 15 years, whom authoritative local school personnel identify as being able to benefit from the program, shall be eligible to participate.

B. Credits. Students shall receive school credits for both in-school related instruction and on-the-job experience.

C. Size. Each program unit shall consist of 12 to 25 students to one W.E.C.E.P. teacher-coordinator.

D. Instructional Schedule. W.E.C.E.P. students will spend a minimum of four periods daily in classroom instruction including one period of 180 hours of instruction devoted to job-related and employability skill instruction, safety and career exploration. Each student will have a minimum of 20 hours of career exploration utilizing the Michigan Occupational Information System (MOIS) and have a minimum of 30 hours of instruction in employability skills training. The employability skills training will equal or exceed the employability skills performance objectives adopted, as part of Michigan Vocational-Technical Service programs. Each local district submitting a letter of application to operate a W.E.C.E.P. program will furnish to the Vocational-Technical Education Service a course outline for the related class.

E. W.E.C.E.P. Teacher-Coordinator. Each program unit shall be under the supervision of a school official to be designated for the purpose of the program as a W.E.C.E.P. teacher-coordinator, who shall generally supervise the program and coordinate the work and education aspects of the program and make regularly scheduled visits to the work stations.

F. Written W.E.C.E.P. Training Agreement. No student shall participate in the program until there has been made a written E.E.C.E.P. training agreement signed by the W.E.C.E.P. teacher-coordinator, the employer and the student. The agreement shall also be signed or otherwise consented to by the student's parent or guardian. The W.E.C.E.P. training agreement will detail job tasks and related in-school instruction. A sample W.E.C.E.P. training agreement will be submitted annually by the local district to the Vocational-Technical Education Service.

G. Provision for Health and Well-Being. Employment under W.E.C.E.P. will not interfere with the schooling of the minors or with their health and well-being.

H. Records and Reports. The names and addresses of each school and the names and addresses of each employer enrolling work experience and career exploration program students and the number of enrollees in each unit shall be kept at the Vocational-Technical Education Service's office. A copy of the written W.E.C.E.P. training agreement for each student participating in the program shall be kept in the local educational office. The records required (for this paragraph) shall be kept for a period of three years from the date of enrollment in the program and shall be made available for inspection or transcription to the representatives of the Administrator of the Wage and Hour Division. Each school district operating a W.E.C.E.P. program shall submit an annual evaluative report by June 30th, which details the results of the W.E.C.E.P. program in terms of attendance and tardiness patterns, grade point average trends and dropout statistics of the enrollees. Based on a favorable state agency evaluation, a local district will be approved on an annual basis to operate a W.E.C.E.P. program. Under no circumstances can a local district operate a W.E.C.E.P. program without first obtaining written state agency approval for the program.

I. Approved Occupations. Employment of minors enrolled in a W.E.C.E.P. program approved pursuant to the requirements of this section shall be permitted in all occupations except the following:

1. Manufacturing and mining.

2. Occupations declared to be hazardous for the employment of minors between 16 and 18 years of age in Subpart E of Part 570 Child Labor Regulations, Orders and Statements of Interpretation of the Federal Fair Labor Standards Act, and occupations in agriculture declared to be hazardous for employment of minors below the age of 16 in Subpart E-1 of this part.

3. Occupations other than those permitted under sections 570.33 and 570.34 except upon approval of a variation in individual cases or classes of cases by the Administrator of the Wage and Hour Division after notice to interested persons and opportunity to be heard.

Employment of minors enrolled in a W.E.C.E.P. program approved pursuant to the requirements of this section shall be confined to not more than 23 hours in any week when school is in session and not more than three hours in any day when school is in session, any portion of which may be during school hours.

Employment of W.E.C.E.P. participants must not have the effect of displacing a worker in the establishment of the employer. Participants in W.E.C.E.P. must be paid according to the statutory minimum wage provision of the Fair Labor Standards Act.

V. Approval of Local Programs

Local school districts desiring approval to operate a W.E.C.E.P. program must submit an annual letter of application by June 30th to the

Michigan Department of Education
Vocational-Technical Education Service
Secondary Unit
Box 30009
Lansing, MI 48909
(517) 373-3365

VOCATIONAL WORK-STUDY

Definition and Purpose

The vocational work-study program is for those students who are in need of earnings from employment in order to commence or continue their vocational education programs.

Administration

The work-study program shall be administered by local educational agencies and made available, to the extent of available funds, to all qualified youth, in the area served by such agencies, who meet requirements.

Eligible Students

Employment under the work-study program shall be furnished only to a student who (a) has been accepted for enrollment or, if already enrolled, is in good standing and in full time attendance as a full-time student in a vocational education program which meets the standards of the state board and of the local educational agency and the requirements of the state plan, (b) is in need of the earnings from such employment to commence or continue a vocational education program, and (c) is at least 15 years of age and less than 21 years of age at the date of commencement of employment and is capable in the opinion of the appropriate school authorities of maintaining good standing in a school program while employed under the work-study program.

Limitation of Hours and Compensation of Employment

No student shall be employed under a vocational work-study program for more than 20 hours in any week in which classes in which the student is enrolled are in session. Summer employment shall not exceed 40 hours per week.

Employers

Employment under work-study programs shall be for the local educational agency or for some other public agency or institution, federal, state, or local and work so performed shall be adequately supervised and coordinated and shall not supplant present employees of such agency or institution who ordinarily perform such work. In those instances where employment under work-study programs is for a federal agency or institution, the written arrangement between the local educational agency and the federal agency or institution shall state that students so employed are not federal employees for any purpose.

Amounts Spent for Employment

In each fiscal year during which the work-study program remains in effect, the local educational agency shall expend for employment of its students an amount in state and/or local funds that is not less than the average annual expenditure for work-study programs of a similar nature during the three fiscal years preceding in which the supplementary plan provisons for its work study program are approved.

Applications, Priorities, and Approval

Work-study programs shall be approved on an individual basis by the state board and shall be consistent with the policies and procedures set forth.

Applications by Local Educational Agencies

Local educational agencies shall submit project proposals to the state board staff for approval in a manner similar to other vocational education programs.

Priority of Projects

Work-study programs will be provided, insofar as financial resources are available, for the undertaking of such programs in the order determined by the application of criteria for determining relative priority of projects which shall include preference for local educational agencies serving communities having substantial numbers of dropouts and unemployed youths and may include other relevant factors such as the extent to which the local educational agencies are using guidance and counseling and other related services designed to achieve the purposes of the work-study program.

ARCHITECTURAL DRAFTING OCCUPATIONS
JOB TITLES

ARCHITECTURAL

D.O.T.	
001.261-014	Landscape Drafter
017.261-034	Heating and Vent. Air
003.281-010	Electrical Drafter
005.281-010	Civil Drafter
001.261-010	Architectural Drafter
005.281-014	Structural Drafter

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter											
L - 1					X												
2					X	X											
3			X	X	X	X											
4			X	X	X	X											
5					X												
6					X												
7					X												
8					X	X											
9					X												
10			X	X	X	X											
11			X	X	X	X											
12			X	X	X	X											
13			X	X	X	X											
14					X	X											
15			X	X	X	X											
16					X												
17					X	X											
18					X												
19					X												

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
L - 20					X	
21					X	
22					X	
23					X	
24					X	
25					X	
26					X	X
27					X	
28					X	X
29					X	
30					X	
31					X	
32					X	
33					X	X
34					X	X
35					X	X
36					X	X
37					X	X
38					X	

3. DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
L - 39					X	X
40					X	X
41					X	X
42					X	X
43					X	X
44					X	X
45					X	X
46					X	X
47					X	X
48					X	
49					X	
50					X	
51					X	
52					X	
53					X	
54					X	X
55					X	X
56					X	X
57					X	X

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS

JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
L - 58				X	X
59	X			X	
60				X	X
61				X	
62				X	X
63				X	X
64				X	X
65				X	X
66				X	
67				X	
68		X	X	X	X
69		X	X	X	X
70	X			X	X
71				X	
72				X	
73				X	
74				X	
75				X	
76	X			X	

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	JOB TITLES: Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
L - 77				X	
M - 1				X	
2	X			X	
3	X			X	
4	X			X	
5	X			X	
6	X			X	
7	X			X	
8	X			X	
9	X			X	
10	X			X	
11	X			X	
12	X			X	
13	X			X	
14	X			X	
15	X			X	
16	X			X	
17	X				
18	X	X	X	X	

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS

JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
M - 19	X	X	X	X	
20	x			X	
21	X			X	
22	X			X	
23			X	X	
24	X			X	
25	X			X	
26	X			X	
27					X
28	X			X	X
29				X	X
30	X			X	
31	X			X	
N - 1	X				
2	X				
3	X				
4	X				
5	X				
6	X				

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS

	JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
N -	7	X				
	8	X				
	9	X				
	10	X				
	11	X				
0 -	1			X		
	2			X		
	3			X		
	4			X		
	5			X		
	6			X		
	7			X		
	8			X		
	9			X		
	10			X		
	11			X		
	12			X		
	13			X		
	14			X		

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
0 - 15				X		
16				X		
17				X		
18				X		
19				X		
20				X		
21				X		
22				X		
23				X		
24				X		
P - 1			X			
2			X			
3			X			
4			X			
5			X			
6			X			
7			X			
8			X			
9			X			

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS

JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
P - 10		X			
11		X			
12		X			
13		X			
14		X			
15		X			
16		X			
17		X			
18		X			
19		X			
20		X			
21		X			
22		X			
23		X			
24		X			
25		X			
26		X			
27		X			
28		X			

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
P - 29		X			
30		X			
31		X			
32		X			
33		X			
34		X			
35		X			
36		X			
37		X			
38		X			
39		X			
40		X			
41		X			
Q - 1					X
2					X
3					X
4					X
5					X
6					X

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
Q - 7						X
8						X
9						X
10						X
11						X
12						X
13						X
14						X
15						X
16						X
17						X
18						X
19						X
20						X
21						X
22						X
23						X
24						X
25						X

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBERS	JOB TITLES	Landscape Drafter	Heating, Vent, and Air	Electrical Drafter	Architectural Drafter	Structural Drafter
0 - 26						X
27						X
28						X
29						X
30						X
31						X
32						X
33						X
34						X

TASK LIST FOR
ARCHITECTURAL DRAFTING

A. PREPARING TO DRAW

1. Adjust drafting table using available knobs or levers to achieve maximum comfort and efficiency reducing drafting fatigue.

2. Clean drafting tools using mild liquid soap, water, and towels to minimize smudges on work.

3. Select drafting (media) using knowledge of end product to develop an acceptable drawing.

4. Select proper sheet size using size description and number of views required to produce drawing.

5. Fasten paper using tape and parallel edge to secure paper properly in preparation for drawing.

6. Select drafting pencils using acquired knowledge to construct necessary lines required to complete a drawing.

7. Select leads using range of available products to match proper lead to drawing media.

8. Point leads using mechanical lead pointer or sandpaper to shape lead for drawing conditions to produce acceptable line weights.

B. DEMONSTRATING BASIC DRAWING SKILLS

1. Draw line types using parallel edge and triangles to develop a drawing.

2. Draw guidelines using parallel edge and lettering guides to draw standard lines required to develop a drawing.

3. Draw break lines using parallel edge, triangle, and reference to produce break lines required to develop a drawing.

4. Draw various line weights using parallel edge, triangles, and compass to produce quality line work required to develop a drawing.

5. Erase lines using eraser, erasing shield, and brush to correct errors in a drawing.

6. Construct specified lines to proper line quality by using assorted drafting pencils and reference material to develop a drawing.

7. Measure line segments using a fractional scale to determine the dimensions required to develop a drawing.

8. Draw line segments using an architect's scale to measure the lines required to develop a drawing.

B. DEMONSTRATING BASIC DRAWING SKILLS (con't)

9. Measure line segments using a decimal inch scale to determine the dimensions required to develop a drawing.

10. Draw line segments using an engineer's scale to measure the lines required to develop a drawing.

11. Draw line segments using a mechanical scale to measure the lines required to develop a drawing.

12. Draw line segments using a metric scale to measure the lines required to develop a drawing.

13. Measure line segments using a metric scale to determine the dimensions required to develop a drawing.

14. Draw horizontal lines using a straight edge to produce the lines required to develop a drawing.

15. Construct a drawing using drafting pencils to develop a clear, neat drawing.

C. DEVELOPING GEOMETRIC CONSTRUCTION

1. Measure angles using a protractor to determine angle dimension required to develop a drawing.

2. Lay out given angles using drafting tools, into specified number of equal parts required to develop a drawing.

3. Set compass using scale and paper to accurately draw arcs and circles required to develop a drawing.

4. Draw curved lines using an irregular curve to produce the required lines to develop a drawing.

5. Draw radii using circle templates to construct radii required to develop a drawing.

6. Construct a tangent line using drafting tools to generate lines tangent to given arcs required to develop a drawing.

7. Bisect a line using drafting tools and basic geometric construction technique to divide a line required to develop a drawing.

8. Divide given lines using drafting tools, into specified number of equal parts required to develop a drawing.

9. Bisect an arc using drafting tools and basic geometric construction technique to divide an arc required to develop a drawing.

10. Bisect an angle using drafting tools and basic geometric construction technique to divide an angle required to develop a drawing.

C. DEVELOPING GEOMETRIC CONSTRUCTION (con't)

11. Construct a regular hexagon using drafting tools as required to develop a drawing.

12. Construct a pentagon using drafting tools as required to develop a drawing.

13. Construct an octagon using drafting tools as required to develop a drawing.

14. Construct a circle using drafting tools to draw a circle through 3 (three) points not in a straight line required to develop a drawing.

15. Construct arcs tangent to given angles using drafting tools as required to develop a drawing.

16. Construct arcs tangent to given arcs using drafting tools as required to develop a drawing.

17. Construct an ellipse using drafting tools, as required to develop a drawing.

18. Construct perpendicular lines using drafting tools and geometric construction technique to draw perpendiculars required to develop a drawing.

D. DEVELOPING PICTORIAL DRAWING

1. Sketch a pictorial drawing using a problem sheet showing parts drawn orthographically to produce an isometric drawing.

2. Construct an isometric drawing using an assigned orthographic drawing to develop a completed drawing.

3. Construct oblique drawings using assigned problems to develop pictorial drawings.

E. DEVELOPING ORTHOGRAPHIC PROJECTION TECHNIQUES

1. Sketch orthographic views using an assigned pictorial drawing to develop the views as required to develop a drawing.

2. Draw orthographic views using drafting tools and an assigned pictorial drawing to construct the views required to develop a drawing.

3. Construct the third view using an assigned two-view drawing to produce a completed three-view drawing.

F. DEMONSTRATING DIMENSIONING SKILLS

1. Place overall dimensions using an assigned problem sheet to produce overall dimensions as required to dimension a drawing.

2. Place size dimensions using an assigned problem with various radii to produce dimensions as required to dimension a drawing.

3. Place location dimensions using an assigned problem with inclined planes to produce dimensions as required to dimension a drawing.

4. Apply metric dimensioning system using drafting tools and an assigned problem to produce dimensions required to dimension a drawing.

5. Apply conventional dimensioning system using drafting tools and an assigned problem to produce dimensions required to dimension a drawing.

G. DEVELOPING SECTIONAL VIEWS

1. Identify sectional views using a problem sheet to recognize usage of various sections required in developing a drawing.

2. Draw sectional views using a problem sheet to illustrate portions of the job required to develop a drawing.

3. Construct a full section using assigned problem to develop a sectional view drawing required in clarification of detail and specification.

4. Construct a removed section using an assigned problem to develop a sectional view drawing required in clarification of detail and specification.

H. DEVELOPING AUXILIARY VIEWS

1. Identify an inclined surface using an assigned problem to utilize visualization skills required to develop a drawing.

2. Identify an oblique surface using an assigned problem to utilize visualization skills required to develop a drawing.

I. DEMONSTRATING SKILLS IN APPLYING FASTENING TECHNIQUES

1. Identify common fasteners using assigned problems to recognize fasteners required for the job.

J. IDENTIFYING SHOP PROCESS

1. Construct standard structural shapes using an assigned problem to recognize and apply the correct selections for a job.

K. DEMONSTRATING JOB ENTRY SKILLS

1. Select drafting media using acquired knowledge to prepare a project required to develop a drawing of proper size and capacity.

2. Letter appropriate systems using reference and knowledge to utilize the style required resulting in a completed drawing.

3. Draw arrowheads using pencil or pen to denote dimension and note reference to develop a drawing.

4. Complete title block using standarized print paper to provide identifying information as required in the title block.

5. Apply change information using a drawing change block to indicate changes required to correct a drawing.

6. Reproduce a drawing using a blueprint machine and blueprint paper to make a copy of the drawing.

7. Apply reference information using an assigned problem to develop an ability to use catalogs and standards required in selection of materials..

8. Construct assembly drawing using assigned problem to understand procedures required in developing drawings and specifications.

9. Construct details on assembly drawings using assigned problem to understand details required in developing drawings and specifications.

L. PLANNING AND PERFORMING ARCHITECTURAL ACTIVITIES

1. Identify different house styles using examples to select the proper design for the job.

2. Solve roof design problems using drafting equipment and examples to produce the correct roof design.

3. Demonstrate familiarity with architectural references using knowledge and references to transpose information into a completed drawing.

4. Identify conventional symbols using an assigned problem to develop a completed drawing.

5. Identify types of foundations using an assigned problem to select the proper type for a job.

6. Identify bath styles using an assigned problem to select the proper style for a job.

7. Identify kitchen styles using an assigned problem to select the proper styles for a job.

8. Identify methods of construction using references to develop a completed drawing.

L. PLANNING AND PERFORMING ARCHITECTURAL ACTIVITIES (con't)

9. Identify framing systems using an assigned problem to select proper systems for a job.

10. Identify architectural drawing abbreviations using an assigned problem to use them correctly in a drawing.

11. Identify current construction materials using an assigned problem to recognize their proper use in a completed drawing.

12. Apply building codes using an assigned problem to transpose information into a completed drawing.

13. Demonstrate efficient craftsmanship using an assigned problem to develop a quality drawing.

14. Draw fasteners using an assigned problem to illustrate architectural fasteners in a completed drawing.

15. Select correct scale for drawing details using an assigned problem to produce a completed drawing.

16. Coordinate the zones of a floor plan using an assigned problem to determine design parameters in a design layout.

17, Layout a house for solar orientation design using an assigned problem to develop a drawing.

18. Draw a floor plan for a small residence using an assigned problem to produce a completed drawing.

19. Develop a complete design plan for a one story house using an assigned problem to produce a completed drawing.

20. Develop the design for a split-level house using an assigned problem to produce a completed drawing.

21. Develop the design for a bi-level house using an assigned problem to produce a completed drawing.

22. Develop the design for a tri-level house using an assigned problem to produce a completed drawing.

23. Develop the design for a one and one-half story house using an assigned problem to produce a completed drawing.

24. Develop the design for a two story house using an assigned problem to produce a completed drawing.

25. Develop the design for a quad-level house using an assigned problem to produce a completed drawing.

26. Develop the design for modular component systems using an assigned problem and finished drawings to produce a completed drawing.

L. PLANNING AND PERFORMING ARCHITECTURAL ACTIVITIES (con't)

27. Dimension a typical floor plan for a small house using an assigned problem to produce a completed drawing.

28. Draw working drawings for multi-family living using an assigned problem to produce a completed drawing.

29. Combine exterior design elements with house styles using an assigned problem to develop a completed drawing.

30. Draw elevations of residential structures using preliminary sketches to produce a completed drawing.

31. Draw complete elevations using an assigned problem to illustrate elevation in a completed drawing.

32. Draw elevations of commercial structure using preliminary sketches to produce a completed drawing.

33. Develop the design for a small commercial building using an assigned problem to produce a completed drawing.

34. Draw working drawings for small commercial buildings using an assigned problem to develop a completed drawing.

35. Identify types of trusses using an assigned problem to select proper trusses for a specific job.

36. Reproduce types of trusses using an assigned problem to draw type required for a specific job.

37. Find roof pitches using a protractor or an architectural template to draw the proper roof slope in a completed drawing.

38. Draw various type of foundations using an assigned problem to illustrate the foundations in completed drawings.

39. Detail a pier and column footing using an assigned problem to develop a completed drawing.

40. Detail a flared footing using an assigned problem to develop a completed drawing.

41. Detail a stepped footing using an assigned problem to develop a completed drawing.

42. Detail a chimney footing using an assigned problem to develop a completed drawing.

43. Detail a porch footing using an assigned problem to develop a completed drawing.

L. PLANNING AND PERFORMING ARCHITECTURAL ACTIVITIES (con't)

44. Draw a foundation plan for a house with a full basement using an assigned problem to illustrate the plan in a completed drawing.

45. Draw a foundation plan for a house with a crawl space using an assigned problem to illustrate the plan in a completed drawing.

46. Draw a foundation plan for a house on a slab using an assigned problem to illustrate the plan in a completed drawing.

47. Draw conventional framing details using an assigned problem to illustrate the details in a completed drawing.

48. Draw bathroom details using an assigned problem to illustrate the plumbing fixtures in a completed drawing.

49. Draw plumbing fixture details using an assigned problem to illustrate the details in a completed drawing.

50. Draw kitchen cabinet details using an assigned problem to illustrate the cabinetry in a completed drawing.

51. Draw fireplace details using an assigned problem to illustrate the detail in a completed drawing.

52. Draw porch details using an assigned problem to illustrate the details in a completed drawing.

53. Draw a cornice detail using an assigned problem to illustrate the detail in a completed drawing.

54. Draw truss layouts using an assigned problem to illustrate the layouts in a completed drawing.

55. Draw a stairway detail using an assigned problem to illustrate stairway detail in a completed drawing.

56. Complete a typical section using an assigned problem to call out items in a completed drawing.

57. Draw a longitudinal section using an assigned problem to illustrate the section in a completed drawing.

58. Draw a transverse section using an assigned problem to illustrate the section in a completed drawing.

59. Draw a plot plan using an assigned problem to illustrate the plan in a completed drawing.

60. Dimension details using an assigned problem to specify the data in a completed drawing.

L. PLANNING AND PERFORMING ARCHITECTURAL ACTIVITIES (con't)

61. Reproduce outline drawings using an assigned problem to illustrate the drawings.

62. Dimension drawings using an assigned problem to provide data in a completed drawing.

63. Pull details from an engineering drawing using an assigned problem to enlarge on details in a completed drawing.

64. Develop framed structure design using an assigned problem to illustrate framing structure in a completed drawing.

65. Develop working drawings using rational problem solving ability and an assigned problem to produce completed drawings.

66. Complete a window schedule using floor plans to transpose information to a completed drawing.

67. Complete a door schedule using floor plans, knowledge of code and room function to transpose information to a completed drawing.

68. Determine the cost units of a house using an assigned problem to specify parameters in a design layout.

69. Prepare a bill of material using design layouts or engineering drawing to provide summary lists in a completed project.

70. Add specifications to a plot plan using an assigned problem to give dimensions in a completed drawing.

71. Draw a one point perspective drawing using an assigned problem to develop a pictorial image of an object.

72. Draw a two point perspective using an assigned problem to develop a pictorial image of an object.

73. Add shadows to a drawing using drafting equipment and a soft lead pencil to develop presentation material.

74. Prepare colored drawing using felt markers to develop presentation material.

75. Prepare paste-ups using sticky-backed transparent film to produce a layout.

76. Build landscape models using plans and appropriate materials to show true proportions of completed job in a project.

77. Construct an architectural study model using plans and appropriate material to show true proportions of completed job.

78. Build a study model for a commercial building using plans and appropriate material to show true proportion of completed job.

M. PLANNING AND PERFORMING SITE PREPARATION ACTIVITIES

1. Apply civil engineer's legend using an assigned problem to develop uniformity in a completed drawing.

2. Prepare graphs using field notes and references to apply field notes in a completed drawing.

3. Plot maps using field notes and references to apply field notes in a completed drawing.

4. Draw plan views using aerial photographs to produce plans in a completed drawing.

5. Prepare reference materials using an assigned problem to assist the survey field crew in locating grading markers.

6. Plot charts using site survey and an assigned problem to show topographical profiles and cross section in a completed drawing.

7. Plot charts using site survey and an assigned problem to show relationships or contours and elevations to buildings in a completed drawing.

8. Measure distances using a map reader and scaled drawing to determine dimensions needed to complete a drawing.

9. Calculate true elevation using field notes and bearings to develop data needed to complete a drawing.

10. Compute angles using field notes and bearings to develop data needed to completed drawing.

11. Construct contours using site surveys to transpose information into a completed drawing.

12. Calculate land/water area using a planimeter, site plan and wordsheet to develop a completed drawing.

13. Collect data for revisions using construction drawings and field notes to produce information about where revisions must be made.

14. Draw a site survey using field notes to transpose information into a completed drawing.

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M. PLANNING AND PERFORMING SITE PREPARATION ACTIVITIES (con't)

15. Reproduce a detailed grading plan and survey notes using an assigned problem to produce a completed drawing.

16. Compute volume of excavation and fills using site surveys and graphs to develop data to complete a project.

17. Prepare a hauling diagram using site survey and profile drawing to give direction resulting in a completed drawing.

18. Draw a plan view of underground utilities using site survey and assigned problem to illustrate a plan resulting in a completed drawing.

19. Draw a profile view of underground utilities using site survey and an assigned problem to illustrate a plan resulting in a completed problem.

20. Draw details of fresh water supplies using site surveys and references to illustrate a plan resulting in a completed drawing.

21. Draw sewage disposal systems using a site survey and assigned problem to develop a completed drawing.

22. Reproduce a detailed drainage plan using survey notes to produce a completed drawing.

23. Draw a utility layout for shopping centers using a site survey and an assigned problem to illustrate a plan resulting in a completed drawing.

24. Reproduce parking lot details using site survey and an assigned problem to illustrate a plan resulting in a completed drawing.

25. Draw catch basins using site survey and an assigned problem to illustrate a plan resulting in a completed drawing.

26. Draw an installation of catch basins using site survey and an assigned problem to illustrate a plan resulting in a completed drawing.

27. Draw bridges using a site survey and an assigned problem to illustrate a plan resulting in a completed drawing.

28. Draw harbor investments using a site survey and an assigned problem to illustrate a plan resulting in a completed drawing.

29. Draw dams using a site survey and an assigned problem to illustrate a plan resulting in a completed drawing.

30. Reproduce a detailed site plan using a preliminary drawing to produce a completed drawing.

31. Reproduce subdivision plots using site survey and an assigned problem to produce a clean, completed drawing.

N. PLANNING AND PERFORMING LANDSCAPE ACTIVITIES

1. Identify properties of landscape materials using an assigned problem to select appropriate landscape accents resulting in a harmonious design.

2. Recognize relative tree and shrub forms using acquired knowledge to identify appropriate plantings in a drawing.

3. Measure distances using a map reader and scaled drawing to determine dimensions to be used in a completed drawing.

4. Draw base drawings using graph paper and straight edge to produce a base drawing in a completed drawing.

5. Reproduce a garden structure plan using a preliminary plan to produce a completed drawing.

6. Apply landscape designs using burnishing plates to show trees and shrubs in a completed drawing.

7. Reproduce detailed scale landscape drawings using a preliminary drawing to construct a completed drawing.

8. Reproduce a detailed irrigation plan using survey notes to produce a completed drawing.

9. Reproduce a detailed planting plan using preliminary plan and planting list to produce a completed drawing.

10. Review quantities of landscape items using landscape drawings and specifications to prepare a summarized price estimation list of landscape items required.

11. Prepare a planting list using landscape drawings and specifications to provide directions for planting.

O. PLANNING AND PERFORMING ELECTRICAL ACTIVITIES

1. Identify common electrical terms using an assigned problem to develop plans for a completed drawing.

2. Identify basic electrical symbols using an assigned problem to transpose information into a completed drawing.

3. Identify electrical graphical symbols using an assigned problem to transpose information into a completed drawing.

4. Identify electrical symbols for industrial wiring using an assigned problem to place them on a completed drawing.

5. Draw electrical graphical symbols using an assigned problem to transpose information to a completed drawing.

O. PLANNING AND PERFORMING ELECTRICAL ACTIVITIES (con't)

6. Draw electrical symbols on plans to illustrate the plan in a completed drawing.

7. Demonstrate knowledge of Electrical Code using the National Electrical Code as a reference to set up an electrical plan for use in a completed drawing.

8. Identify circuit requirements in electrical drawings using an assigned problem to determine the intent of the drawings.

9. Determine the number of circuits required for a small house using an assigned problem to develop a completed drawing.

10. Draw electrical circuits using an assigned problem to set up an electrical plan in a completed drawing.

11. Draw electrical components using an assigned problem to illustrate the plan in a completed drawing.

12. Analyze schematic electrical drawings using an assigned problem to determine the intent of the drawing.

13. Draw a schematic diagram using an assigned problem to illustrate the diagram in a completed drawing.

14. Draw a block diagram using an assigned problem to illustrate the diagram in a completed drawing.

15. Draw a one-line diagram using an assigned problem to illustrate the diagram in a completed drawing.

16. Select residential circuits using an assigned problem to prepare a house wiring recommendation.

17. Draw an electrical wiring layout of a small house using an assigned problem to illustrate the layout in a completed drawing.

18. Draw an electrical wiring diagram for a small commercial building using an assigned problem to illustrate the diagram in a completed drawing.

19. Calculate service entrance load using an assigned problem to set up an electrical plan in a completed drawing.

20. Select proper size of service entrance using an assigned problem to set up an electrical plan in a completed drawing.

21. Recognize graphs used in electrical drawing using an assigned problem to transpose information into a completed drawing.

22. Draw a connection diagram using an assigned problem to illustrate a diagram plan in a completed drawing.

O. PLANNING AND PERFORMING ELECTRICAL ACTIVITIES (con't)

23. Reproduce a detailed lighting plan using a preliminary plan to produce a completed drawing.

24. Produce a master drawing using an assigned problem and component details to create a comprehensive plan layout in a completed drawing.

P. PLANNING AND PERFORMING HEATING, VENTILATING AND AIR CONDITIONING ACTIVITIES

1. Identify trade abbreviations using knowledge to develop heating and ventilation plans.

2. Identify trade symbols using knowledge to construct heating and ventilating plans.

3. Select system components using manufacturer catalogs and job layout to establish a materials list for the job.

4. Identify heating systems using trade references to make the correct heating system recommendation for a job.

5. Identify various duct systems using an assigned problem to make the correct duct system recommendation for a job.

6. Draw trade symbols using an assigned problem to illustrate a completed drawing.

7. Draw single line symbols using an assigned problem to illustrate pipe fitting and valves in a completed drawing.

8. Draw double line symbols using an assigned problem to illustrate pipe fittings and valves in a completed drawing.

9. Layout square ducts using an assigned problem to give direction and reference in a completed drawing.

10. Layout cylinders using an assigned problem to give direction and reference in a completed drawing.

11. Layout a truncated right cylinder using an assigned problem to give direction and reference in a completed drawing.

12. Layout square elbows using an assigned problem to give direction and reference in a completed drawing.

13. Layout round elbows using an assigned problem to give direction and reference in a completed drawing.

14. Layout square transition pieces using an assigned problem to give direction and reference in a completed drawing.

P. PLANNING AND PERFORMING HEATING, VENTILATING AND AIR CONDITIONING ACTIVITIES (con't)

15. Layout square to round transition pieces using an assigned problem to give direction and reference in a completed drawing.

16. Layout elbow square to round transition pieces using an assigned problem to give direction and reference in a completed drawing.

17. Layout the intersection of two cylinders using an assigned problem to give direction and reference in a completed drawing.

18. Layout the intersection of a prism and a cylinder using an assigned problem to give direction and reference in a completed drawing.

19. Draw a branch duct using an assigned problem to illustrate a branch duct in a completed drawing.

20. Draw a volume damper using an assigned problem to illustrate a volume damper in a completed drawing.

21. Draw a splitter damper using an assigned problem to illustrate a splitter damper in a completed drawing.

22. Draw an air extractor using an assigned problem to illustrate an air extractor in a completed drawing.

23. Draw a preliminary floor plan using an assigned problem for a small residence to establish a reference for heat and vent layout in a completed drawing.

24. Draw ventilating system plans using materials list and preliminary plans to provide a comprehensive layout of the job in a completed drawing.

25. Draw air conditioning plans using a materials list and preliminary plans to provide an air conditioning layout in a completed drawing.

26. Draw a wall section using an assigned problem for a small residence to establish heat and vent layouts in a completed drawing.

27. Prepare heat-loss calculations using an assigned problem to demonstrate energy saving techniques in a completed project.

28. Calculate heat loss using area "R" factor, temperature differential and infiltration to determine heating requirements in a project.

29. Calculate flow estimation using duct sizing table or ductulator to compute flow volume and/or ratio in a project.

30. Interpret a residential floor plan using worksheets to determine heating and ventilating requirements.

31. Interpret a commercial floor plan using worksheets to determine heating and ventilating requirements.

P. PLANNING AND PERFORMING HEATING, VENTILATING AND AIR CONDITIONING ACTIVITIES (con't)

32. Draw air returns using an assigned problem to illustrate air returns in a completed drawing.

33. Draw process flow diagram using symbols for essential components to develop a preliminary drawing.

34. Complete a materials list using manufacturer catalogs and job layout to establish a job estimation form.

35. Identify heat piping systems using trade references to make the proper system recommendations for the job.

36. Draw a series loop system using boiler, expansion tank and baseboard units to produce a plan in a completed drawing.

37. Draw a one pipe system using boiler expansion tank and baseboard units to produce a plan in a completed drawing.

38. Draw a two pipe system using boiler, expansion tank and baseboard units to produce a plan in a completed drawing.

39. Draw a two-piece reverse return system using boiler, expansion tank and baseboard units to produce a plan in a completed drawing.

40. Draw heating plans using layout materials list and preliminary plans to provide a comprehensive heating plan in a completed drawing.

41. Draw residential heating systems using a plan to complete a drawing.

Q. PLANNING AND PERFORMING STRUCTURAL ACTIVITIES

1. Identify common terms for structural drafting using an assigned problem to correctly label a plan in a completed drawing.

2. Identify standard structural shapes using an assigned problem to select proper shapes and make correct recommendation.

3. Detail standard structural shapes using an assigned problem to illustrate the shapes in a completed drawing.

4. Identify welding symbols using an assigned problem to label a plan in a completed drawing.

5. Draw welding symbols using an assigned problem to given direction and reference in a completed drawing.

6. Determine standard spacing of fasteners using an assigned problem to select the proper method of spacing fasteners in a completed specification.

Q. PLANNING AND PERFORMING STRUCTURAL ACTIVITIES (con't)

7. Determine fastener sizes using an assigned problem to select the proper size in a completed specification.

8. Detail steel wall panels using an assigned problem to illustrate the panels in a completed drawing.

9. Detail steel decking panels using an assigned problem to illustrate the decking panels in a completed drawing.

10. Draw gage lines using an assigned problem to illustrate the plan in a completed drawing.

11. Place erection marks on a design drawing using an assigned problem to show correct directions in a drawing.

12. Detail columns using an assigned problem and design notes to illustrate the columns in a completed drawing.

13. Detail column splices using an assigned problem and design notes to illustrate the splices in a completed drawing.

14. Prepare column schedules using an assigned problem and design notes to provide proper procedures in a completed specification sheet.

15. Prepare beam schedules using an assigned problem and design notes to produce proper procedures in a completed specification sheet.

16. Prepare a beam bending diagram using an assigned problem to produce proper procedures in a completed diagram sheet.

17. Calculate loads using an assigned problem to determine the strength of material in a design drawing.

18. Solve structural calculations using an assigned problem to determine the strength of material in a design drawing.

19. Sketch detail connections using sketch pad, pencil, and design notes to complete a drawing.

20. Detail skewed members using an assigned problem and design notes to illustrate the skewed members in a completed drawing.

21. Detail sloping members using an assigned problem and design notes to illustrate the skewed members in a completed drawing.

22. Detail stirrups using an assigned problem and design notes to illustrate the stirrups in a completed drawing.

23. Detail trusses using an assigned problem and design notes to illustrate the trusses in a completed drawing.

Q. PLANNING AND PERFORMING STRUCTURAL ACTIVITIES (con't)

24. Detail joint layouts using an assigned problem and design notes to illustrate joint layouts in a completed drawing.

25. Letter specifications using a working drawing to transpose information to a completed list.

26. Interpret tabular data charts using references to transpose information in a completed drawing.

27. Draw line details using an assigned problem to illustrate the details in a completed drawing.

28. Draw laminated wood structural members using an assigned problem and members to complete a drawing.

29. Reproduce three-hinged arches using an assigned problem to illustrate the arches in a completed drawing.

30. Reproduce two-hinged barrel arches using an assigned problem to illustrate the arches in a completed drawing.

31. Draw pre-cast concrete wall panels using an assigned problem to illustrate the panels in a completed drawing.

32. Draw arrangements of metal forms on a drawing using an assigned problem to illustrate the arrangements in a completed drawing.

33. Reproduce framing plans on a drawing using an assigned problem to illustrate the framing plans in a completed drawing.

34. Solve problems from design layouts using an assigned problem to prepare detail drawings.

R. USING EMPLOYABILITY SKILLS

1. Investigate employment information using sources of employment information to identify employment opportunities.

2. Identify job requirements using health, physical, legal, education, and other occupational information to determine the requirements of an occupation.

3. Acquire wage information using available resources to determine the approximate entry wages, general wage range, and significant fringe benefits for an occupation.

4. Identify significant non-wage job characteristics using available resources to determine shift requirements, union affiliation, apprenticeships, occupational hazards, characteristics of work environment and other significant job factors.

R. USING EMPLOYABILITY SKILLS (con't)

5. Explore employment opportunities using available resources to describe local, regional, and national employment opportunities for an occupation.

6. Analyze career ladder using available resources to describe job progression in an occupation.

7. Identify personal criteria with information about available alternatives using a decision-making situation and procedures and skills in decision-making to choose a job, further training or other alternatives.

8. Prepare a resume using personal information to apply for a job.

9. Write a letter of application using personal notes to apply/inquire about a job.

10. Complete a job application using personal notes to apply for a job.

11. Demonstrate appropriate dress using a knowledge of job requirements to comply with standards of on-the-job dress and grooming.

12. Complete a job interview using communication and interpersonal skills to become employed.

13. Describe personal criteria using references to identify acceptable job offers.

14. Demonstrate interpersonal skills to achieve successful relationships with others.

15. Identify source of continuing education for an occupation using available resources to identify career ladder alternatives.

16. Describe job termination procedures using a knowledge of the occupational area to leave a particular job.

Duty: Preparing to Draw	**Duty No.** A
	Task No. 1

Task: Adjust drafting table using available knobs or levers to achieve maximum comfort and efficiency reducing drafting fatigue.

Achievement Indicators: The learner:	Yes	No
1. Adjusted drafting table for proper lighting -	____	____
2. Adjusted drafting table for maximum working efficiency -	____	____
3. Adjusted stool height for comfort -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specification.

Tools and Equipment:	**Resources:**

Duty: Preparing to Draw	**Duty No.** A
	Task No. 2

Task: Clean drafting tools using mild liquid soap, water, and towels to minimize smudges on work.

Achievement Indicators: The learner:	Yes	No
1. Constructed clean drawings -	____	____
2. Used clean tools -	____	____
3. Used proper cleaners -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Preparing to Draw	**Duty No.** A
	Task No. 3

Task: Select drafting (media) using knowledge of end product to develop an acceptable drawing.

Achievement Indicators: The learner:	Yes	No
1. Drafting media was suitable for finished product -	____	____
2. Used proper drafting media to obtain finished product-	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Preparing to Draw	**Duty No.** A
	Task No. 4

Task: Select proper sheet size using size description and number of views required to produce drawing.

Achievement Indicators: The learner:

	Yes	No
1. Selected proper sheet size using size description and number of views required to produce drawing -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Preparing to Draw	**Duty No.** A
	Task No. 5

Task: Fasten paper using tape and parallel edge to secure paper properly in preparation for drawing.

Achievement Indicators: The learner:	Yes	No
1. Fastened paper parallel to straight edge -	____	____
2. Fastened paper securely -	____	____
3. Fastened paper smoothly for proper drawing -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Preparing to Draw	**Duty No.** A
	Task No. 6

Task: Select drafting pencils using acquired knowledge to construct necessary lines required to complete a drawing.

Achievement Indicators: The learner:	Yes	No
1. Drew proper line quality -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Preparing to Draw	**Duty No.** A
	Task No. 7

Task: Select leads using range of available products to match proper lead to drawing media.

Achievement Indicators: The learner:	Yes	No
1. Drew proper line quality -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Preparing to Draw	**Duty No.** A
	Task No. 8

Task: Point leads using mechanical lead pointer or sandpaper to shape lead for drawing conditions to produce acceptable line weights.

Achievement Indicators: The learner:	Yes	No
1. Drew proper line weight -	____	____
2. Used correct point -	____	____
3. Used lead pointer correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 1

Task: Draw line types using parallel edge and triangles to develop a drawing.

Achievement Indicators:	The learner:	Yes	No
1.	Drew line types correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 2

Task: Draw guidelines using parallel edge and lettering guides to draw standard lines required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Made guide lines parallel -	____	____
2. Drew to specification size requirement -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 3

Task: Draw break lines using parallel edge, triangle, and reference to produce break lines required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Drew break lines correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 4

Task: Draw various line weights using parallel edge, triangles, and compass to produce quality line work required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Made consistant line quality -	____	____
2. Drew proper line weight -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 5

Task: Erase lines using eraser, erasing shield, and brush to correct errors in a drawing.

Achievement Indicators: The learner:	Yes	No
1. Erased lines cleanly -	____	____
2. Made a clean drawing -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 6

Task: Construct specified lines to proper line quality by using assorted drafting pencils and reference material to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Correctly utilized alphabet of lines to produce appropriate lines -	____	____
2. Produced line quality correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 7

Task: Measure line segments using a fractional scale to determine the dimensions required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Measured line segments correctly with a fractional scale -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 8

Task: Draw line segments using an architect's scale to measure the lines required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Scaled measurements correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 9

Task: Measure line segments using a decimal inch scale to determine the dimensions required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Measured line segments correctly with a decimal scale -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 10

Task: Draw line segments using an engineer's scale to measure the lines required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Scaled measurements correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty:	Duty No. B
	Task No. 11

Task: Draw line segments using a mechanical scale to measure the lines required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Scaled measurements correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 12

Task: Draw line segments using a metric scale to measure the lines required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Scaled measurements correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 13

Task: Measure line segments using a metric scale to determine the dimensions required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Measured line segments correctly using metric scale -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 14

Task: Draw horizontal lines using a straight edge to produce the lines required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Drew horizontal lines correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Demonstrating Basic Drawing	**Duty No.** B
	Task No. 15

Task: Construct a drawing using drafting pencils to develop a clear, neat drawing.

Achievement Indicators: The learner:	Yes	No
1. Constructed a drawing that was correct, clear and neat -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 1

Task: Measure angles using a protractor to determine angle dimension required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Measured angles accurately -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty:	Duty No. C
	Task No. 2

Task: Lay out given angles using drafting tools, into specified number of equal parts required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Layed out given angles correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	Resources:

Duty:	Duty No. C
	Task No. 3

Task: Set compass using scale and paper to accurately draw arcs and circles required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Set compass accurately -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial specifications.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 4

Task: Draw curved lines using an irregular curve to produce the required lines to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Drew curved lines correctly using an irregular curve -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 5

Task: Draw radii using circle templates to construct radii required to develop a drawing.

Achievement Indicators: The learner:

	Yes	No
1. Drew radii correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 6

Task: Construct a tangent line using drafting tools to generate lines tangent to given arcs required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Constructed lines tangent to given arcs -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 7

Task: Bisect a line using drafting tools and basic geometric construction technique to divide a line required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Divided a line correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 8

Task: Divide given lines using drafting tools, into specified number of equal parts required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Divided lines correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 9

Task: Bisect an arc using drafting tools and basic geometric construction technique to divide an arc required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Divided the arc correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 10

Task: Bisect an angle using drafting tools and basic geometric construction technique to divide an angle required to develop a drawing.

Achievement Indicators: The learner:	Yes	No
1. Bisected the angle correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 11

Task: Construct a regular hexagon using drafting tools as required to develop a drawing.

Achievement Indicators: The learner:

	Yes	No
1. Constructed hexagon correctly -	_____	_____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**

Duty: Developing Geometric Construction	**Duty No.** C
	Task No. 12

Task: Construct a pentagon using drafting tools as required to develop a drawing.

Achievement Indicators: The learner:

	Yes	No
1. Constructed pentagon correctly -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to industrial standards.

Tools and Equipment:	**Resources:**